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### Control and Elimination of Thistles

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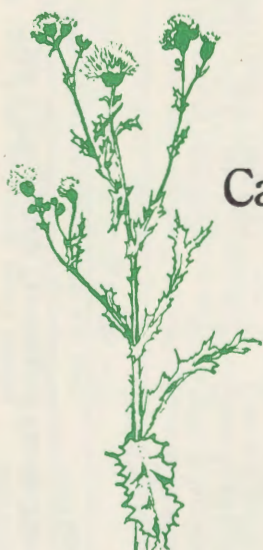
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Control and Elimination of

# Thistles



Canada Thistle



Perennial Sowthistle



# Thistles

## Canada Thistle Perennial Sowthistle

*Use of a trade name does not imply endorsement of one product over another.*

By Lyle A. Derscheid, Extension Agronomist and  
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Canada thistle<sup>1</sup> and perennial sowthistle<sup>2</sup> are deep-rooted perennials that spread by seeds and underground parts. They emerge later in the spring and are less difficult to kill than leafy spurge, Russian knapweed, or hoary cress. They emerge about the same time as bindweed.

They are cross-pollinated so flowers must be open before seed can be produced. Seeds are developed early and are ready to germinate 8 to 10 days after the flowers have opened. Each seed is attached to a tiny parachute that can be carried miles by air currents.

Canada thistle infests about 100 thousand acres on 19 thousand farms in South Dakota, while perennial sowthistle infests about 120 thousand acres on 12 thousand farms.

Single plants spread by means of seeds and roots to develop patches. Seeds scattered by the wind develop into sprinklings of plants throughout the countryside, which creates a different problem than that associated with other noxious weeds. These light infestations sometimes are not recognized as a crop hazard. They do reduce yields, however. In one test 2 Canada thistle plants per square yard reduced wheat yield 18%, while 19 plants per square yard reduced yields 36%. A patch of sowthistle caused a 69% reduction of oats yields.

Some Canada thistle plants are susceptible to 2,4-D, some are resistant to the herbicide, and some are intermediate in reaction. Most Canada thistle infestations contain some plants of each group. Spraying kills the susceptible plants, but resistant ones remain and produce more resistant plants.

To control or eliminate these thistles, use intensive cultivation, nonselective chemicals, certain competitive crops, selective herbicides, or several combinations of cultivation, crops and chemicals.

<sup>1</sup>*Cirsium arvense* L.

<sup>2</sup>*Sonchus arvensis* L. and *S. uliginosus* Bieb.

### REDUCE STANDS 75 TO 90%

Combinations of cultivation, cropping, and chemicals can reduce the stand of thistles 75% or more in 1 year.

**Intensive Cultivation.** Cultivate every 3 weeks during good growing conditions and every 4 weeks during dry, hot weather when plants are growing less rapidly. This generally means cultivating at 3-week intervals during June and July and at 4-week intervals during August, September, and early October.

Cultivation from spring until freeze-up will kill a high percentage of thistle plants. However, cultivation from immediately after harvest of small grain one year until freeze-up the next year is more effective.

A duckfoot field cultivator or blade is the most satisfactory implement; a one-way disk is also fairly effective. If there is considerable plant residue on the area to be cultivated, it may be necessary to use the moldboard plow for the first operation. Equip the cultivator with wide sweeps (12 to 60 inches) that overlap 3 to 4 inches. Keep them sharp; be sure they are kept flat when in the soil and operating at a depth of 4 to 5 inches. The same is true for the one-way disk. Keep the disks sharp and operate at a depth of 4 to 5 inches. Each thistle root must be cut by each cultivation.

It takes 10 to 15 days for new shoots to emerge after the roots have been cut. Another 10 to 15 days elapse before there are enough leaves to produce more food than is needed for growth. Therefore, little plant food is stored in the roots and the root reserves are being used for plant growth for a period of 3 to 4 weeks. Cultivation at the end of each 3- or 4-week period causes a continuous drain on the root reserves. The food supply in the roots is eventually depleted and the plants die.

Combining intensive cultivation for part of the season with the production of a crop and chemical application is generally more practical than an entire season of cultivation. Income from the crop is



obtained and erosion hazards resulting from a full season of cultivating are greatly reduced.

**Small Grain, Spraying, and Cultivation.** Use  $\frac{3}{4}$  pound of 2,4-D or MCPA per acre when grain is in the 5-leaf stage of growth (early June) to kill susceptible plants, prevent seed production, and weaken resistant plants. Use an amine form of 2,4-D or MCPA because an ester form frequently kills the tops of the thistles without killing the roots. After harvest use a treatment that will kill plants that are weakened but not killed by the spray.

There are several systems that can be used.

1. Spray in the grain and cultivate three or four times after harvest. In experimental tests, spraying with  $\frac{3}{4}$  pound of 2,4-D reduced the stand 30%, but plowing in early August and two cultivations in September reduced the stand an additional 58% for a total of 88% in one year. The cultivation was done with a duckfoot cultivator equipped with 12-inch sweeps. A cultivator equipped with wider sweeps used for all three cultivations will probably give the same results and leave crop residue on the surface to reduce hazards of erosion.
2. Spray in the grain, plow shortly after harvest and spray thistles that emerge on the plowing. In experimental tests, the plowing and fall spraying was as effective as plowing and two cultivations, resulting in an 88% stand reduction. Under field conditions this type of fall treatment is less satisfactory. First, there is no way to leave a residue to prevent erosion. Second, thistles sometimes do not emerge early enough to be sprayed—spraying should be done at least a week before frost. Third, thistles not killed by the first application of 2,4-D or MCPA are frequently not affected by a second application—this can be partially remedied by using one herbicide in the grain and the other in the fall.
3. Spray in the grain, spray in the stubble and late fall plow in October. In experimental tests, two sprayings gave 79% elimination of thistles and late fall plowing killed an additional 10% for a total of 89% in one year. This treatment leaves the land bare over winter.

**Cultivation and Summer Crops.** Cultivate with duckfoot cultivator or blade three times before seeding a close-drilled crop of soybeans, forage sorghum, sudangrass, or buckwheat during late June. Harvest the crop, fall plow, and cultivate once or twice. This system reduces the stand of thistles 75 to 80% in 1 year.

**Cultivation and Forage Crops.** Cultivate with a duckfoot cultivator or blade every 3 weeks between June 1 and August 15. Seed alfalfa at the rate of 8 pounds per acre, or a mixture of alfalfa and a perennial grass. In a mixture use brome grass or intermed-

iate wheatgrass at the rate of 12 pounds per acre. The stand of thistles is generally reduced 80 to 90% by this system. The cultivation is essential to reduce the competition from a thick stand of thistles so that the crop can get established. However, in thin stands of thistles, equally good results have been obtained when the forage crop was underseeded with a companion crop that was clipped during late June.

**Amitrole-T.** Use 4 to 6 pounds active ingredient of Amitrole-T (brand names "Cytrol" or "Amitrol-T") in 40 to 50 gallons of water per acre when thistles are starting to bud. In experimental tests such treatment reduced the stand of Canada thistle about 90% in 90% of the trials. Similar treatments made on thistles 6 to 8 inches tall generally gave good top kill, but very little root kill. Excellent results are sometimes obtained by treating regrowth of thistles that have been mowed or plowed. Treatments should be made with 4 to 6 pounds acid equivalent per acre after regrowth is 8 inches tall and before buds start.

Amitrole-T is not a selective spray and will injure most crops. It can safely be used in tree plantings, if spray drift is not allowed to contact the leaves. It acts slowly and thistles may not be completely dead for 6 weeks. Thistles droop and turn yellow in about 10 days; however, they sometimes appear to recover by the end of 3 or 4 weeks but then die. Regrowth will generally be yellow. Amitrole-T is somewhat expensive, but is frequently useful for eliminating patches. It is generally less effective on sowthistle than on Canada thistle.

#### **REDUCE STANDS 10 TO 50%**

Combinations of crops, cultivation, and 2,4-D or MCPA spraying reduce the stands of Canada and perennial sowthistle 50% in one year.

**Small Grain and 2,4-D or MCPA.** Use  $\frac{3}{4}$  pound of 2,4-D or MCPA per acre when spring grain is in the 5-leaf stage to kill susceptible plants, to prevent others from going to seed, and to weaken resistant plants. Spray again after harvest. In experimental tests the first spraying reduced the stand about 30%. The small grain got ahead of the resistant plants and held them in check until harvest. The second spraying (about 2 weeks after harvest) with  $\frac{3}{4}$  pound of 2,4-D per acre reduced the stand an additional 30 to 40%. It is seldom advisable to use this practice more than 1 year out of three. Two sprayings generally kill most of the susceptible plants, and spraying in subsequent years generally allows resistant plants to reproduce. Better results may be obtained by using MCPA for one spraying and 2,4-D for the other.

**Corn or sorghum and 2,4-D or MCPA.** Spray corn or sorghum twice a year. Spray one week after first cultivation with  $\frac{1}{2}$  pound of 2,4-D or MCPA



per acre. Spray again after corn has tasseled or sorghum has headed. Apply  $\frac{3}{4}$  pound of 2,4-D or MCPA with a high-clearance sprayer equipped with drop nozzles. In experimental tests this system reduced thistle stands 10 to 30%. It is not advisable to use this system more than 2 years out of three. Spraying kills the susceptible plants and allows resistant ones to reproduce. Better results may be obtained by using MCPA for one spraying and 2,4-D for the other.

**Alfalfa.** A good stand of alfalfa or alfalfa-grass mixture also reduces the stand of thistles 10 to 20% each year. Two years of alfalfa or alfalfa-grass mixture is useful as a follow-up of the system that includes a season of cultivation and a fall seeding of the crop.

**Perennial grass and 2,4-D.** Spray in smooth brome grass or wheatgrass (other sod forming grasses may be as effective in areas where adapted) with  $\frac{3}{4}$  pound of 2,4-D or MCPA during early June and again in August. This system reduced the stand of thistles 10 to 25% each year in experimental tests. It is useful as a follow-up to a system that includes a season of cultivation prior to seeding the grass. Two sprayings a year in already established grass seldom gives 100% elimination, even when repeated for several years. The spray kills susceptible plants, but allows resistant plants to reproduce. Better results may be obtained by using MCPA for one spraying and 2,4-D for the other.

#### PREVENT SPREADING

Spraying once a year with 2,4-D in small grain, corn, sorghum or perennial grass reduces the stand of thistles slightly and keeps them from spreading to any great degree. Spray either crop with  $\frac{1}{2}$  pound of 2,4-D per acre.

#### PREVENT SEED PRODUCTION

Mow before flowers have been open 1 week or spray before blooming to prevent seed production.

Prevention of seed production is more important for thistles than for most noxious weeds. It can be done by mowing or spraying at the proper time. Since a high percentage of seeds are ready to germinate after flowers have been open 8 to 10 days, mowing cannot be delayed more than 1 week after blooming. Likewise, spraying with  $\frac{1}{3}$  to  $\frac{1}{2}$  pound of 2,4-D must be done before blooming.

You need not be concerned about thistle buds in seed grain. They must open before pollination takes place and they must be open over a week before seeds are mature enough to germinate. Although there is no possibility of the buds containing viable seeds, there is still a possibility that older heads were threshed.

#### THREE-YEAR PROGRAMS

A total of 56 combinations of crops, cultivation, and spraying were tested. Fifty of them reduced the stand of thistles over 90%, while half of them gave complete elimination. Results from several of the combinations are given in table 1.

#### NONSELECTIVE HERBICIDES

Numerous chemicals can be used to eliminate patches (weed nurseries) with one treatment. Apply the chemical to a band 6 or 8 feet wide around the outside of the patch to kill roots that extend beyond the patch. Seedling growth may appear after 2 or 3 years. These young plants can be eliminated with a 2,4-D application. Many new nonselective chemicals do not permanently injure perennial grasses, but will prevent crop growth for 2 or more years.

Table 1. The Average Percentage of Canada Thistle Killed in Three Years

First Year		Second Year		Third Year	
Treatment*	% Kill	Treatment*	% Kill	Treatment*	% Kill
Grain; 2,4-D 6/7	30	Same as 1st year	40	Same as 1st year	50
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Same as last year	100	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Corn; 2,4-D 6/20 and 8/20	95	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Cult. 6/7 and 6/20; Sudan	99	Flax; $\frac{1}{4}$ lb. MCPA	99
Grain; 2,4-D 6/7; plow 8/11; 2,4-D 9/25	88	Same as 1st year	98	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; 2,4-D 9/25	88	Corn; 2,4-D 6/20 and 8/20	98	Same as 1st year	100
Grain; 2,4-D 6/7 and 8/25; plow 10/15	89	Same as 1st year	100	Same as 1st year	100
Grain; 2,4-D 6/7 and 8/25; plow 10/15	89	Corn; 2,4-D 6/20 and 8/20	92	Same as 1st year	98
Cult. 6/7, 6/28, 7/19, 8/9; alfalfa 8/15	88	Harvest hay	98	Harvest hay	100
Cult. 6/7, 6/28, 7/19, 8/9; brome 8/15	88	Harvest hay	93	Harvest hay	100
Alfalfa underseeded in oats; clip 6/20	62	Harvest hay	89	Harvest hay	100

\*All 2,4-D applications were at the rate of  $\frac{3}{4}$  lb./A. of an amine form; cultivations were performed with duckfoot cultivator equipped with 12-inch sweeps. Spraying and cultivating were done on the dates designated.



The chemicals listed in table 2 generally give 95 to 100% elimination when applied at the rates designated. Rates are given in pounds, pints, or fluid ounces of commercial product for each square rod. Use the higher rates for summer application for those chemicals indicating a range of treatment rate.

#### REDUCE STANDS IN SHELTERBELTS

Use AMS as suggested in table 2 or Amitrole-T as previously suggested.

To reduce stands 10 to 25% in 1 year, use 1½ lbs. 2,4-D acid equivalent per acre twice each season (early June and late August). Use very low volatile formulations of 2,4-D such as an emulsifiable acid formulation (brand name "Weedone 638"), an oil soluble amine formulation (brand names "Emulsamine 3E" or "Dacamine"), or the lithium salt of 2,4-D (brand name "Lithate DSP"). Do not allow spray drift to contact leaves of trees; it will cause injury.

Table 2. Amount of Nonselective Herbicide Required to Kill Canada and Perennial Sowthistle

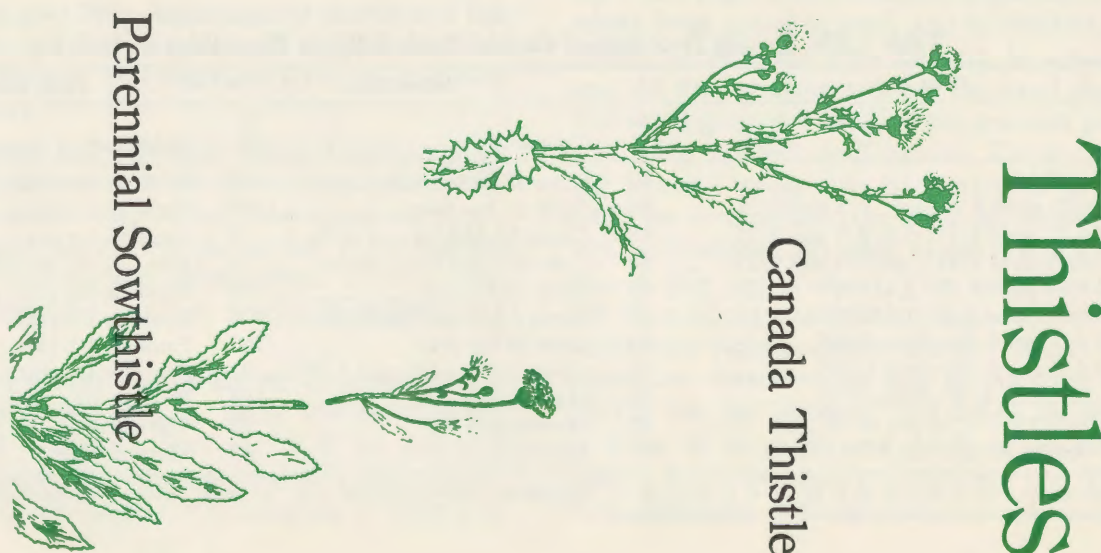
Chemical	Amount per Square Rod	Cost per Square Rod*	Amount per Acre	Cost per Acre
AMS (1) _____	4-6 lb.	\$1.44-2.52	_____	_____
"Atlacide" _____	6-8 lb.	1.10-1.85	_____	_____
Sodium chlorate _____	5 lb.	0.87	_____	_____
2,3,6-TBA (2) _____	¾ pt.	0.47	15 lbs. (7½ gal.)	\$75.00
Fenac (3) _____	½ pt.	0.52	15 lbs. (10 gal.)	\$82.50
Borate-TBA Mixture (4) _____	1 lb.	0.58	_____	_____
CBMM (5) _____	6-8 lb.	1.60-2.56	_____	_____
Dicamba (6) _____	1½ fl. oz.	0.38	8 lbs. (2 gal.)	\$60.00
Picloram (7) _____	¾ fl. oz.	0.25	2 lbs. (1 gal.)	\$40.00
TBP-2,4-D Mixture (8) _____	5 fl. oz.	0.38	12 lbs. (6 gal.)	\$60.00

\*Approximate retail cost of chemical for 1 square rod at lower rates for areas 10 to 15 square rods in size. Cost decreases for large areas and varies somewhat with local situations.

- (1) Brand Name "Ammate X"
- (2) Brand Names "Benzac 1281," "Trysben 200" (approved for use on noncropland—do not graze with in 1 year)
- (3) Brand Name "Fenac" (Do not use treated forage for feed)
- (4) Brand Names "Benzabor," "Amoco Noxious Weed Killer," and "Coop-TBA Granules"
- (5) Brand Name "Chlorea"
- (6) Brand Name "Banvel D" (approved for use on noncropland only)
- (7) Brand Name "Tordon 22K" (approved for use on noncropland only)
- (8) Brand Names "Tritac D," "Amoco Noxious Weed Killer D," and "TBP Liquid Weed Killer"

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